

Ewing Mountain Vegetation Project Environmental Assessment

Forest Communities Report

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for:

Mt. Rogers National Recreation Area

George Washington and Jefferson National Forests

Executive Summary

The George Washington and Jefferson National Forests (GWJ) rest in the Appalachian Mountains, which run across several eastern states in North America. The area within the Jefferson National Forest (JNF), which was administratively combined with the George Washington National Forest (GWNF) in 1995, was heavily exploited for its resources in the late 19th and early 20th centuries. The area has a long history of coal mining that still exists today. During the turn of the 20th century, mountainsides were cleared of timber and farmed. These activities threatened watersheds in the area. In 1936, partly in response to this threat, the JNF was established through the authority outlined in the Weeks Act to aid in the protection of the watersheds within the area.

The Ewing Mountain Project is a vegetation management project located within Wythe (8,101 acres), Grayson (5,391 acres), and Carroll (3,766 acres) County, Virginia (Figure 1). The project area is approximately 17,258 acres in size and generally located directly south of the town of Wytheville. It is within the Slate Spring Branch-Cripple Creek, Poor Branch-New River, Brush Creek-New River, Francis Mill Creek-Cripple Creek, Eagle Bottom Creek-New River, and Turkey Fork-Elk Creek (all HUC 12) watersheds. The project area lies in the East Iron Mountain Management Area (Forest Plan pp. 4-20), and is located within the Cripple Creek, Austinville, and Speedwell topographic quadrangle maps.

It includes the following Management Prescriptions (Figure 2):

- 7E2 *Dispersed Recreation Areas – Suitable*; 10,446 acres
- 8E1 *Ruffed Grouse/Woodcock Habitat Emphasis*; 2,195 acres
- 9H *Management, Maintenance, and Restoration of Forest Communities*; 1,359 acres
- 7G *Pastoral Landscapes*; 1,345 acres
- 4C1 *Geologic Areas*; 817 acres
- 6C *Old Growth Forest Communities Associated with Disturbance*; 480 acres
- 7B *Scenic Corridors*; 254 acres
- 7D *Concentrated Recreation Zones*; 193 acres
- 6B *Old Growth Forest Communities Dependent on Fire*; 88 acres
- 6A *Old-growth Forest Communities not Associated with Disturbance*; 59 acres
- 11 *Riparian Corridors*; 21 acres

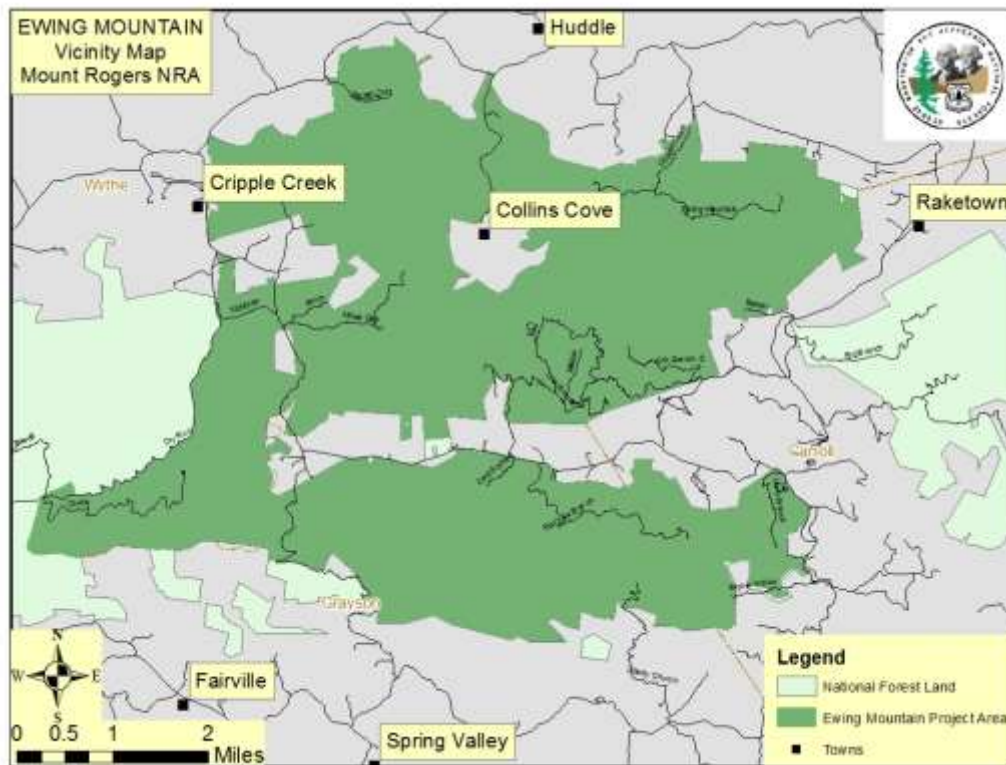


Figure 1. Ewing Mountain project vicinity map

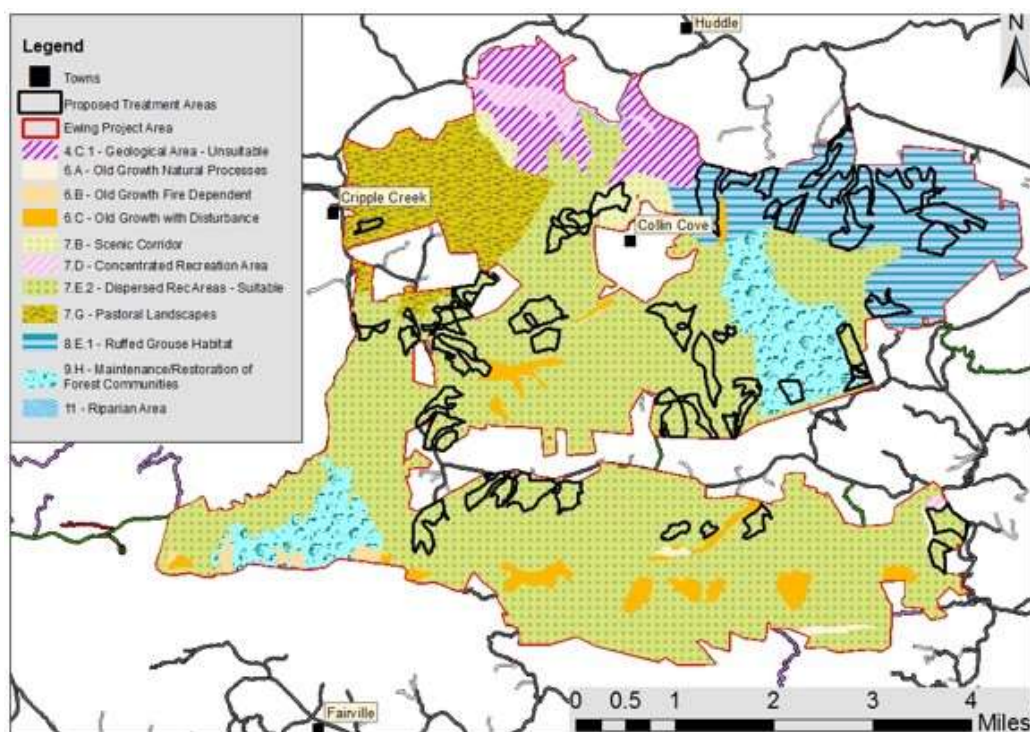


Figure 2. Ewing Mountain Forest Plan Management Prescriptions (Rx)

This project is designed based on the vegetation management objectives of the *Revised Land and Resource Management Plan Jefferson National Forest* (hereinafter referred to as the Forest Plan) (USDA Forest Service, 2004a) with a focus on the Management Prescription (Rx) 7E2 *Dispersed Recreation Areas - Suitable* (Forest Plan, pp. 3-102 through 3-105). Areas in this prescription receive moderate to high recreation use and are managed to provide a variety of dispersed recreation opportunities, improve the settings for outdoor recreation, and enhance visitor experiences in a manner that protects and restores the health, diversity, and productivity of the land. Additionally, focus will be on 8E1 *Ruffed Grouse /Woodcock Habitat Emphasis* areas (Forest Plan, pp. 3-125 through 3-128). This management prescription area emphasizes providing optimal habitat for the ruffed grouse, an economically important small game bird that has experienced population declines throughout its range.

The proximity to Wytheville and other more populated areas of Virginia and North Carolina contribute to high recreational use within the project area. Main recreational activities with the project area are horseback riding, hunting, fishing, and camping. Recreation sites in the area include Raven Cliff, Collins Cove Horse Camp, and Sunrise Cabin. Hussy Mountain Horse Camp is just outside of the project area boundary, and the Virginia Highlands Horse Trail runs through the area.

Along with approved recreational uses of the area, other activities are also affecting resources in the project area. Illegal all-terrain vehicle use is a growing problem, including Bournes Branch and Ewing Mountain. Additionally, equestrian users have created unauthorized trails that can contribute to erosion and impact resources. In areas of high visitation, non-natives are easily transported into the project area from outside the project area. Non-natives can displace native vegetation, especially in disturbance areas.

Historical uses of the East Iron Mountain Management Area include timber harvesting and mining. Mining for manganese was largely completed around Cripple Creek and Speedwell prior to 1950, and most of these mines have been restored except for one that is located southwest of the town of Cripple Creek. Saturated soils and flash flooding events can affect previously mined areas with overly steep slopes, resulting in landslides and stream sedimentation.

Introduction

Regulatory Framework

Federal Statutes

The authority for maintaining and/or restoring forestland and woodland health is derived from Federal statutes enacted by Congress and Executive Orders, as well as Federal Directives and Forest Service Policies. A Federal statute, or law, is an act or bill which has become part of the legal code through passage by Congress and approval by the President (or via congressional

override). Although not specified below, many of these laws have been amended. These laws include:

Anderson-Mansfield Reforestation and Revegetation Act of October 11, 1949

Provides for the reforestation and revegetation of National Forest System lands and other lands under the administration or control of the Forest Service.

Federal Land Policy and Management Act of October 21, 1976

Requires that public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use. Also states that the United States shall receive fair market value of the use of the public lands and their resources unless otherwise provided for by law.

Forest and Rangeland Renewable Resources Planning Act of August 17, 1974, as amended by the National Forest Management Act (NFMA) of October 22, 1976

The National Forest Management Act reorganized, expanded, and otherwise amended the Forest and Rangeland Renewable Resources Planning Act of 1974, which called for the management of renewable resources on National Forest System lands. The National Forest Management Act requires the Secretary of Agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the National Forest System. It is the primary statute governing the administration of National Forests.

Knutson-Vandenberg Act of June 9, 1930

Authorizes the Secretary of Agriculture to establish forest tree nurseries; to deposit monies from timber sale purchasers to cover the costs of planting young trees, sowing seed, removing undesirable trees or other growth, and protecting and improving the future productivity of the land; and to furnish seedlings and/or young trees for the replanting of burned-over areas in any National Park.

Multiple-Use Sustained-Yield Act (MUSY) of June 12, 1960

States that it is the policy of Congress that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes, and authorizes and directs the Secretary of Agriculture

to develop and administer the renewable surface resources of the national forests for the multiple-use and sustained-yield of products and services.

National Environmental Policy Act of January 1, 1970

Directs all Federal agencies to consider and report the potential environmental impacts of proposed Federal actions, and established the Council on Environmental Quality.

Organic Administration Act of June 4, 1897

Authorizes the President to modify or revoke any instrument creating a national forest; states that no national forest may be established except to improve and protect the forest within its boundaries, for the purpose of securing favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of citizens of the United States. Authorizes the Secretary of Agriculture to promulgate rules and regulations to regulate the use and occupancy of the national forests.

Secure Rural Schools and Community Self-Determination Act of 2000

Extended by the Further Consolidated Appropriations Act of 2020. The annual average of 25 percent of 7 fiscal years of receipts from each national forest shall be paid to the State or Territory in which said forest is situated, to be expended for the benefit of the public schools and public roads of the county or counties in which the forest is situated. If the Secure Rural Schools Act is not authorized, counties will revert back to receiving the 1908 Act (25%) payments.

Stewardship End Result Contracting Projects (16 U.S.C. 2104)

Grants the Bureau of Land Management and the Forest Service ten-year authority to enter into stewardship contracts or agreements to achieve agency land management objectives and meet community needs. With P.L. 113-79, Section 8205 (2014 Farm Bill), Congress permanently authorized FS and BLM to enter into stewardship contracts and agreements. The 2018 Farm Bill allows for 20-year stewardship contracts/agreements.

Supplemental National Forest Reforestation Fund Act of September 18, 1972

Directs the Secretary of Agriculture to establish a supplemental national reforestation fund, and states that money transferred to this fund shall be available to the Secretary for the purpose of supplementing programs of tree planting and seeding on National Forest System lands determined by the Secretary to be in need of reforestation.

Sustained Yield Forest Management Act of March 29, 1944

Authorizes the Secretaries of Agriculture and the Interior to establish by formal declaration cooperative sustained-yield units which shall consist of federally owned or administered forest land under their jurisdiction and, in addition thereto, land which reasonably may be expected to be made the subject of one or more of the cooperative agreements with private landowners authorized by section 2 of the Act in order to promote the stability of forest industries, of employment, of communities, and of taxable forest wealth through continuous supplies of timber and forest products; and in order to secure the benefits of forests in the maintenance of water supply, regulation of stream flow, prevention of soil erosion, amelioration of climate, and preservation of wildlife.

Timber Export Act of March 4, 1917

Permits the Secretary of Agriculture to allow timber or other forest products to be cut or removed from a national forest and exported from the state or territory in which that national forest is situated.

Timber Exportation Act of April 12, 1926

Authorizes the exportation of lawfully cut timber from the state or territory where grown if the supply of timber for local use will not be endangered, and authorizes the Secretary to issue rules and regulations to carry out the provisions of the Act.

Tribal Forest Protection Act of 2004

Authorizes the Secretary of Agriculture and the Secretary of the Interior to enter into an agreement or contract with Indian tribes meeting certain criteria to carry out projects to protect Indian forest land or rangeland, including a project to restore Federal land that borders on or is adjacent to Indian forest land or rangeland.

Twenty-Five Percent Fund Act of May 23, 1908

Provides that twenty-five percent of all monies received from the sale of timber or other forest products shall be paid to the state in which such forest is located to be expended as the state may prescribe for the benefit of public schools and roads.

Wood Residue Utilization Act December 19, 1980

Enacted to develop, demonstrate, and make available information on feasible methods that have the potential for commercial application to increase and improve utilization in residential, commercial, and industrial or power plant applications of wood residues resulting from timber harvesting and forest

protection and management activities occurring on public and private forest lands, and from the manufacture of forest products, including wood pulp.

Regulations

Below is a partial listing of relevant regulations. Federal executive departments and administrative agencies write regulations to implement laws. Regulations are secondary to law. However, both laws and regulations are enforceable.

36 CFR 221 Timber Management Planning - Sets forth the requirements for management plans for National Forest timber resources.

36 CFR 223 Sale and Disposal of National Forest System Timber - Sets forth the requirements relating to the sale and disposal of National Forest System timber.

Forest Service Directives

The Forest Service Manual (FSM) and Forest Service Handbooks (FSH) contains legal authorities, goals, objectives, policies, responsibilities, instructions, and the necessary guidance to plan and execute assigned programs and activities.

FSM 2000 National Forest Resource Management

- **FSM 2020** Ecological Restoration and Resilience
- **FSM 2070** Biological Diversity
 - FSM 2070.3 Vegetation Ecology (use of native plants in re-vegetation, rehabilitation, and restoration)

FSM 2400 Timber Management, Southern Region and George Washington and Jefferson NFs supplements

- **FSM 2430** Commercial Timber Sales, Southern Region supplements
- **FSM 2470** Silvicultural Practices
- **FSH 2409.13** Timber Resource Planning Handbook, Ch. 30 – Timber Sale Scheduling, WO Amendment 2409.13-92-1, Effective 8/3/92. Provides optional agency direction as recommended guidance.

Methodology

Spatial Scale (direct, indirect, and cumulative effects analysis areas)

The analysis area for direct and indirect effects on forest vegetation is the project area. Cumulative effects for the forest vegetation were analyzed at the stand level. This is because a single tree or a small group of trees does not function in the same way as a stand or a group of stands within a forest.

Temporal Scale (The length of time effects are considered for impacts)

The temporal bounds of this analysis include past management activities that have shaped the current vegetation conditions within the project area and any foreseeable vegetative manipulation within the next 10 years. This is because after 10 years a stand is typically within the sapling/pole stage and does not contribute to early successional goals as outlined in the forest plan.

Measurement Indicators

Percent of stands in early successional habitat (ESH) after treatment. Trees per acre (TPA) of oak species within a stand throughout rotation. Forest products contributing to local markets. These three measurement indicators will be used to compare alternatives.

For Cumulative Effects analysis, the measurement indicator will be whether a stand retains the potential to be forested. The threshold for significant effects will be if a stand cannot be reforested.

Analysis Methods and Assumptions

Forest vegetation was sampled using a science-based sampling methodology. We used the quick plot protocol for Common Stand Exam (CSE) to inventory the project area. This was done to reduce cost and increase the amount of acres surveyed in the timeframe we had for examinations. Due in large part of this projects purpose and need being driven by stand structure and composition; this limited inventory method met the needs for surveying the Project Area, using an unbiased systematic sampling method. The sampling occurred from 2017 to 2019, with a walk-through visual survey being completed in winter of 2019.

While sampling each plot, tree data were collected for standing live and dead trees that were greater than 5 inches in diameter at breast height (DBH) while using a 10 basal factor prism. At each point, tree and stand info was inventoried for species, diameter at breast height (DBH), height, age, site index (SI), density and basal area. Sample point data were summarized and average stand attributes determined. To inventory vegetation composition we used a 1/300th acre fixed radius plot to measure seedlings 1 foot in height to saplings with a DBH up to 4.9 inches. Seedlings less than 1 foot in height were not recorded because newly established oak seedlings (generally a desired species for regeneration) grow too slowly to compete with other species and

cannot be considered a viable source of regeneration (Loftis 1990). However, these small seedlings potentially could be cultivated into something viable for future regeneration harvest by doing a mid-story removal or through the careful use of prescribed fire.

In an attempt to move acres of forested structural states and species goals toward desired structural conditions and species composition for each stand, all cutting methods were examined with respect to how well they contribute to ESH and species compositional goals. ESH goals were analyzed by summing up the acres, which are large enough to function as early successional habitat, within a stand that is being recommended for regeneration harvest.

In the analysis for this resource, the following assumptions have been made:

- Weather extremes and climate change are assumed to be equivalent for all alternatives. Only improvements to forest conditions are compared between alternative with respect to managed resiliency to weather and climate changes.
- When the structure and tree species compositions for all vegetation developmental states are in the desired conditions, native insects and diseases function more in their natural ecosystem roles.
- FSH 2409.18 Chapter 30, 31-Project Analysis and Design & 32-Economical and Financial analysis at Gate 2, directs the Forest Service on financial analysis. ESH goals which are planned as timber harvest are economically viable and structure goals will be met. See GWJ 2400-64a and GW-FS-2400-11 in the project record for details.

Incomplete and Unavailable Information

This report is based on the best available science.

Disturbance Regimes

The biotic, abiotic and social factors culminate to create conditions and principles to be considered across regional, landscape and stand levels. These factors are also important in contributing to the dynamic makeup of each scale of consideration. They also contribute to disturbance factors as well. These factors combined with natural and human disturbances or the lack thereof, are what have influenced the regional, landscape and stand structure and composition found both historically and today. Understanding disturbance history is important for explaining contemporary vegetation properties and guiding ecosystem restoration (Foster 2000).

Natural Disturbance

The forest managed by the Jefferson National Forest (JNF) is susceptible to several natural disturbances. Understanding the disturbances that are created by any natural disturbance is important. Disturbances affect how forest allocate resources and will have an impact on how

forest vegetation responds when a disturbance occurs (Johnson et al. 2009). The most substantial natural disturbances for the JNF are fire, wind and native insects.

Fire has contributed to vegetation development in many temperate forest ecosystems of eastern North America (Abrams 1992; Harrod et al. 2000). It is thought that fires ignited by humans and possibly lightning were widespread and frequent across eastern North America before European settlement (e.g. Abrams 1992; Frost 1998; Brose et al. 2001). In montane pine-oak stands, in a study going back to 1700, fires occurred approximately every 5 years and area wide fires every 16 years until 1930 without any evidence of a temporal trend in fire frequency (Aldrich et al. 2010). Fire occurrence exhibited little relationship with reconstructed annual drought conditions, transition from Native American to Euro-American settlement or during the period of industrial logging in the start of the 20th century (Flatley et al. 2013). Except for fire protection, changes in land use has no discernible influence on fire frequency (Aldrich et al. 2010). After 1930 fire occurrence has substantially declined, in montane pine-oak stands, due to fire exclusion. This is an important factor to consider because Appalachian forest are considered to have developed in association with fire (Frost 1998; Williams 1998; Brose & Waldrop 2006).

Wind and insects typically result in small scale disturbances where single trees or a small groups of trees are removed from competition. However, increased crown size and tree vigor can reduce stands susceptibility to mortality during an insect attack. These small-scale disturbances give advance regeneration that have developed in the understory a competitive edge to capture the growing space when a disturbance occurs. In closed canopy mature forest, such as the case in much of the project area, shade tolerant species such as red maple (*Acer rubrum*), blackgum (*Nyssa sylvatica*) and sourwood (*Oxydendrum arboreum*) usually dominate the midstory. These species will likely take advantage of these small-scale disturbances when they occur and will change the composition of the stands over time.

Human Disturbance

Much of the forest was cut through and repeatedly burned, as mentioned above, in the late 1800s and early 1900s before it was acquired by the Forest Service. Large portions of the forest were cut in a manner that could be considered extensive high grading. Poor quality and undesirable tree species were left, while the better trees were cut. Market value often dictated timing of cutting as different species became valuable at different times and for different purposes. Sometimes this resulted in multiple entries over time removing trees with different purposes in mind. Advances in technology allowed trees to be removed further and further from roads. Often what was left by the time it was acquired by the Forest Service in 1936 was the trees that were difficult to get to and remove. For this reason, much of what remains on the Jefferson National Forest are stands 80-100 years of age with small pockets of much older trees that can be found scattered throughout. These are often a few acres or less in size.

Project Area Existing Condition

The project area contains approximately 17,258 gross acres of land within the contiguous project area. The Ewing Mountain Project Area lies on eleven separate Forest Plan Management Prescriptions (Rx). As indicated in Table 1, there are pockets of three management prescriptions involving old growth (Rx 6A, 6B, and 6C) within the project area which total 627 acres (about four percent) . The northeastern edge of the project area is the 8E1 *Ruffed Grouse /Woodcock Habitat Emphasis* Rx and makes up approximately 2,195 acres (12.7%) of the project area. The majority of the project area is located within the 7E2 *Dispersed Recreation Areas - Suitable* Rx (10,446 acres, about 60 percent). Other management prescriptions within the project area are listed below in Table 1. Riparian corridors (Management Rx 11) are embedded and found throughout the project area.

Table 1. Management Prescriptions within the project area.

| Management Rx | Number | Acres | Percent |
|--|--------|--------|---------|
| Dispersed Recreation Areas (Suitable for Timber Production) | 7E2 | 10,446 | 60.5% |
| Ruffed Grouse and Woodcock Habitat | 8E1 | 2,195 | 12.7% |
| Management, Maintenance, and Restoration of Forest Communities | 9H | 1,359 | 7.9% |
| Pastoral Landscapes | 7G | 1,345 | 7.8% |
| Geologic Areas | 4C1 | 817 | 4.7% |
| Old Growth Forest Communities Associated with Disturbance | 6C | 480 | 2.8% |
| Scenic Corridors and Viewsheds | 7B | 254 | 1.5% |
| Concentrated Recreation Areas | 7D | 193 | 1.1% |
| Old Growth Forest Communities Dependent on Fire | 6B | 88 | 0.5% |
| Old Growth Forest Communities Not Associated with Disturbance | 6A | 59 | 0.3% |
| Riparian Corridors | 11 | 21 | 0.1% |

The entire project area is skewed to the late successional habitat where approximately 66 percent of the acres are late successional (Table 2), with very little early successional habitat (ESH, or 0-10 years). The existing condition of the project area does not meet the overall project objective to maintain at least four percent of the acreage in habitat that is less than 10 years old for Rx 7E2 or at least ten percent of the acreage in the upland project area for Rx 8E1. The majority of proposed treatments to increase ESH are planned to take place within Rx 7E2 and 8E1, with thinnings mostly proposed for stands in Rx 7E2.

Table 2. Existing successional habitats within the project area

| Successional Habitat | Acres | Percent |
|---|---------------|----------------|
| Early (0-10 yrs.) | 146 | 0.8% |
| Sapling/Pole (11-40 yrs.) | 978 | 5.7% |
| Mid (41-80 yrs.) | 1,792 | 10.4% |
| Late Successional (81-129 or 139 yrs. depending on forest community type) | 11,423 | 66.3% |
| Old Growth (130 or 140+ yrs. depending on forest community type) | 2,122 | 12.3% |
| Total | 16,405 | 95.1% |

Across the project area there is roughly 147 non-forested acres embedded within the management prescriptions outlined above. These are roads (68 acres) and maintained wildlife openings (79 acres). In the forested area, there has been one timber harvest in the project area in the past 10 years. The Fry Hill timber sale was awarded in 2009 and completed by 2015. It was located in the western portion of the current project area and covered approximately 156 acres. Stands that were harvested prior to the Fry Hill timber sale are now fully regenerated and can be described as being in either the sapling or immature pole timber stage of development. These stands are no longer providing ESH, which is an important wildlife habitat objective.

Oaks dominate the landscape, varying between chestnut oak-scarlet oak stands on the drier ridges to northern red oak and white oak in areas of deeper soils and more moisture. Much of the Ewing Mountain project area is fully to overstocked, above the B and A line respectively, in the Gingrich (1967) stocking chart (Figure 1), and of coppice origin. Stand factors such as tree age, species composition and stocking are associated with oak decline. Oak Decline is a slow-acting disease complex. Several biotic and abiotic factors contribute to the decline, meaning no single cause can be pointed at for the cause. However, overstocked stands of mature trees exacerbate moisture stress during drought periods and increase risk of mortality. Mature trees found on drier sites such as rocky soils on ridgetops and south- to west-facing slopes are usually the most affected (Clatterbuck and Kaufmann 2006). When site index equals or is less than tree age, the risk of oak decline increases, especially for red oaks (Oak et al. 1991). To prevent mortality resulting from oak decline it is recommended to maintain healthy vigorous trees. The best way to do this is by thinning or maintaining a stocking close to the B line in the Gingrich (1927) stocking chart (Figure 1) (Clatterbuck and Kaufmann 2006).

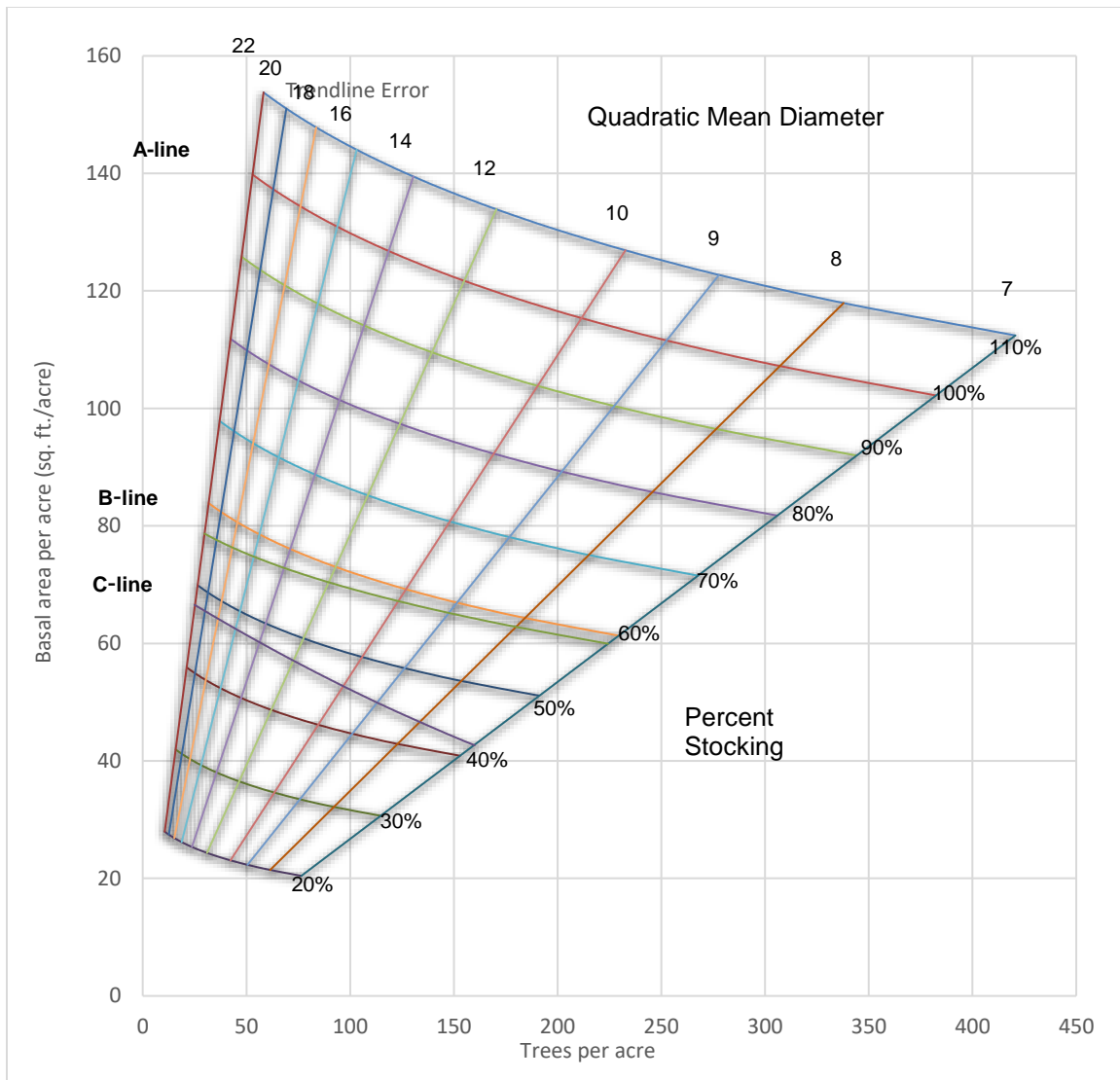


Figure 3. Roach and Gingrich's (1968) stocking chart, showing a stand at 90% stocking

Yellow pines are prevalent on the south aspects of dry ridges within the project area, such as portions of compartments 4977 and 4979. White pines have also been planted throughout the project area, resulting in dense understories of white pine seedlings/saplings in these and adjacent stands. Site indices range from fair to poor with soil depth and moisture being the limiting factor. On the drier sites, oak-yellow pine stands can be found in small patches, although in declining health. These relatively low site index stands often have a thicket of mountain laurel growing below them. Vaccinium species cover the ground on most of the dry sites throughout the project area. This is generally a mix of high bush blueberry, low bush blueberry, and huckleberry. The midstory species are dominated by blackgum, red maple, sourwood. In some areas, mountain laurel and rhododendron dominates the understory.

Non-native invasive plant species (NNIS) threaten the integrity of native ecosystems on the Jefferson National Forest; this issue was raised in public comments on the project and during internal discussions. The development of the proposed management activities included consideration of existing and potential undesirable plant species, which include non-native invasive plant species. Site-specific control efforts include control/eradication treatments and follow-up monitoring of those treatments to ensure effectiveness. Areas of focus include: log landings, skid trails, haul roads, and areas near existing seed sources where soil disturbing activities are proposed.

Several non-native invasive species have been identified to some extent in and adjacent to the proposed harvest units, areas of proposed temporary road construction, and along existing roads. Many of these species are sun-loving plants that require sunlight to grow and flourish. Species seen during field visits include tree-of-heaven (*Ailanthus altissima*), autumn olive (*Elaeagnus umbellata*), Japanese honeysuckle (*Lonicera japonica*), Japanese barberry (*Berberis thunbergii*), garlic mustard (*Alliaria petiolata*), multiflora rose (*Rosa multiflora*), paulownia (*Paulownia tomentosa*), and tall fescue (*Schedonorus arundinacea*).

Environmental Effects

Forest vegetation would be directly affected by regeneration harvest as the stand development shifts from Oliver and Larson's (1996) stem exclusion to stand initiation. All openings created to make early successional habitat (ESH) would meet the Forest Plan Standard FW-114 maximum opening size of 40 acres due to resource buffers and areas not being proposed for harvest. Early successional creating harvest would increase sunlight to the forest floor, which would favor the establishment of new trees, shrubs, forbs, and other vegetation, while fulfilling the ESH desired condition discussed in the need for this project.

Regenerating tree species composition is expected to be similar to the existing vegetation due to the viable nearby seed sources and to the potential for regeneration within the harvested stands. Each stand being harvested to create ESH is expected to establish enough viable regeneration within five years after harvest to meet restocking requirements (2004 Forest Plan, p. 2-33 & 2-34). Natural regeneration is expected to grow at current site potential as soil productivity is not expected to decline from existing condition (See Soils section.). Trees are expected to be vigorous and mostly insect and disease free.

Regeneration methods such as clearcut, coppice and shelterwood with reserves are two aged harvesting systems being recommended. Commercial thinning is also being considered as a potential treatment method. It was determined that all of these management systems would meet the needs for the proposal due to their ability to contribute to the goals outlined in the project purpose and need.

Over 60 percent of the project area is in the 7E2 *Dispersed Recreation Areas – Suitable Rx*, which has an objective (7E2-OBJ1) to “maintain a minimum four percent of the prescription area

in early successional forest habitat conditions.” FW 7E2-007 states “These areas are suitable for timber production where hunting recreation and watchable wildlife are emphasized.” Additionally, FW 7E2-008 mentions “an emphasis on group selection, thinning, and shelterwood treatments.” The majority of stands considered for treatment in 7E2 (1,059 acres) have been recommended for thinning based on the rotation age recommendations (7E2-010). Another 48 acres of shelterwood with reserves treatments has been recommended for stands at rotation age within 7E2. Without the proposed thinning, stands within the project area would remain overstocked. Overstocked stands exhibiting reduced growth rates are susceptible to insect and disease infestations. Competition for sun, water and nutrients will reduce the growth of the trees. Reduced crowns and tree vigor resulting from competition will further result in the mortality of pines and other important mast producing trees.

Almost 13 percent of the project area is in the 8E1 *Ruffed Grouse/Woodcock Habitat Emphasis* Rx. Objectives for this management prescription include maintaining a minimum of ten percent of the area in early successional forest habitat (ESH) conditions (8E1-OBJ1) and another ten percent of the area in late successional to old growth forest conditions greater than 100 years of age (8E1-OBJ2). Currently, there is a lack of ESH (less than one percent) in 8E1, but the proposed action would increase ESH to over eight percent for this management prescription. FW 8E1-017 states the “primary regeneration harvest method is clearcutting” and there are approximately 300 acres proposed for harvest by clearcutting with reserves. Conversely, there is an abundance of late successional to old growth conditions (about 70 percent) in 8E1. Treatments in the proposed action would still provide about 60 percent of stands in 8E1 within late successional to old growth forest conditions, well over the ten percent objective. An additional 257 acres in 8E1 that hasn’t reached rotation age (8E1-019) is proposed for thinning. Without an increase in ESH from the proposed treatments, optimal habitat for ruffed grouse would not be created or enhanced.

If the proposed treatments were not implemented, the stands within the project area would become older, with approximately 65 percent of the forested acreage becoming greater than 100 years old by the end of the next ten years. The balance of the project area would skew toward stands over 100 years old and would not meet the intent of either Rx 7E2 (at least four percent of the acreage in habitat that is less than 10 years old) or Rx 8E1 (at least ten percent of the acreage in the upland).

Shade tolerant species in the understory will continue to grow, and over the long-term, gap dynamics will move stands within the project area from oak dominated stands, to favor more shade tolerant species in the overstory such as red maple, black gum and in some cases white pine if treatments are not initiated to counter this shift. On sites of better quality (site index 70 and above for oak), the forest composition would be expected to shift toward red maple and yellow poplar as the oak dies out. This would not be expected to happen for another 100 years or more as natural succession occurs.

Other proposed treatments are found within two management prescriptions representing almost 16% of the project area. Within 7G *Pastoral Landscapes Rx*, one stand totaling 12 acres is proposed for clearcutting of white pine (with type conversion) in the Pellbridge pasture allotment. The intent is to improve the open landscape of the pastoral landscape, specifically to encourage the presence of certain watchable wildlife species associated with old-field habitat (7G-001). White pine will be removed in both stands, while hardwood and yellow pine species will be retained to provide scattered mast production in the future. Often, there is a hard edge between the forested areas and the pasture fields. Within the forested areas (and specifically the white pine stands), there is typically little understory development except in areas with canopy gaps. Removal of white pine will provide light to help promote the development of the desired vegetation for this prescription, which is predominantly low grasses and wildflowers with some native deciduous and evergreen shrubs interspersed with an occasional tree, hedgerow, or small woodlot. Increasing grassland can provide habitat for species such as golden-winged warbler, loggerhead shrike, orchard oriole, black rat snake, and white-tailed deer. Management prescription 9H *Management, Maintenance, and Restoration of Forest Communities* represents 7.9% of the project area and contains four stands that are proposed for treatment. Three stands are recommended for thinning (15 acres), and another stand (24 acres) is recommended for a regeneration harvest using coppice with reserves (~25 BA of white oak, northern red oak, yellow pine, and chestnut oak retained) to ensure adequate sunlight for oak regeneration (9H-009). Regenerated stands will help contribute to reaching the desired 4-10% early successional class within this management prescription (9H-004). Additionally, thinnings will favor removal of white pine to promote maintenance and restoration of southern yellow pine forest communities (9H-005).

Approximately 43 acres of thinnings are proposed for 7B *Scenic Corridors and Viewsheds Rx*, a management prescription classified as suitable for timber production (7B-009) with “group selection, individual tree selection, thinning, and shelterwood harvests” (7B-010) mostly used. Thinnings will alter stand structure and species composition resulting in a mosaic of tree species of various densities and stem sizes (7B-006) while improving the health/vigor of residual trees. The increased diversity should increase habitat for watchable wildlife species (7B-001).

The potential to introduce or increase the presence of invasive non-native plants in this project area is related to the amount of acres harvested. Tree-of-heaven does not need full sunlight to establish itself; it is a windborne seed that can become established in partial shade. While individuals of tree-of-heaven and other NNIS tree, shrub and vine species may become established and/or grow in the harvest units, they are not expected to dominate the stand, nor are they expected to comprise a significant component of the stands as basal bark herbicide treatments are planned as a control measure. If they were to gain a foothold in the stands, some would eventually be shaded out by competing native species and most would not reach the upper canopy. Ultimately, the forest composition in these stands would not change significantly.

Autumn olive and garlic mustard are shade tolerant species, and are generally associated with the road system, including the roadsides and roadbed itself. Pre-haul and post treatment of the roadside edges within the project area will reduce the potential of spread of existing populations of NNIS plants. The spread of these types of invasive species can also be reduced by quickly seeding disturbed areas with non-invasive species or the use of native grasses and wildflowers beneficial as wildlife foods. Also, the potential spread and establishment of NNIS would be mitigated by requiring logging equipment to be inspected and free of soil, seeds, and other attached material before entering onto National Forest ownership.

Without the proposed treatments, the past establishment and spread of non-native invasive species would continue to occur through the creation of canopy gaps that result from natural tree mortality or catastrophic natural events. Non-native species along the roadsides would continue to be treated under the decision space of the Forest-wide Non-Native Invasive Plant Control EA (USDA 2010).

Economic Impact

In the 2006 study, *Virginia's Forest Our Common Wealth*, Virginia Department of Forestry estimated that for every dollar of stumpage received by forest landowners, \$41.82 is generated by value added activities. In a more recent 2013 report on the *Economic Impacts of Agriculture and Forest Industries in Virginia* it was found that, every job created in forestry-related industries in the Virginia economy produces 1.6 other jobs in Virginia. Every dollar generated in the agriculture and forestry-related industries results in another \$1.63 value-added in the Virginia economy. The forestry sector alone in Virginia has a total impact of over \$17 billion in total industry output, approximately 103,800 jobs, and \$8.8 billion in Value-added. In an attempt to quantify the social economic benefits of ecological services provided by the forestland in Virginia, a value transfer approach was used to determine that the Commonwealth receives \$6.385 billion in estimated air and water environmental services value from forestry each year (Rephann 2013).

To meet the need of the project, the trees being removed will be sold to fulfill the need for providing marketable wood products. This project has the potential to contribute 16,800 hundred cubic feet (CCF) over the next five years. Given that recent sales of size and composition have sold for \$25/CCF, the potential for this alternative is to provide \$420,000 of value to local markets. This does not include any value added activities.

Cumulative Effects

The impacts of all past actions are represented by the existing situation as far as vegetation is concerned. As noted above, these past actions include the Fry Hill timber sale, which was completed by 2015, and stands that were harvested prior to the Fry Hill timber sale. These latter stands are now fully regenerated and can be described as being in either the sapling or immature

pole timber stage of development. The effects from Fry Hill and prior treatments are sufficiently isolated temporally and geographically that they will not have a cumulative impact with the expected effects of the Ewing project.

All harvested areas in the Ewing project are expected to regenerate and develop as described in the direct and indirect effects section above. Reasonably foreseeable actions in the harvest units include site preparation and herbicide treatments to control invasive and undesirable species. These areas may also be subject to prescribed fire treatments if included in a future decision. The combined effect would be a reduction in competition to desirable regeneration.

Summary of Effects

Table 3. Summary of Effects by Alternative

| Measurement Indicator | Proposed Action |
|--|----------------------|
| Early successional habitat (ESH) | 406 Acres |
| % desired species (Oak and Yellow Pine) | Maintain / Increases |
| Forest products contributing to local market | 16,800 CCF |

Table 4. Forest Plan Consistency for Vegetation and Forest Health Resource

| Forest Plan Standards / Objectives | Proposed Action |
|---|-----------------------|
| 7E2-OBJ1 Maintain a minimum of 4% ESH (stand age less than 10 years, openings 2 acres in size and greater) | 2.0% |
| 8E1-OBJ1 Minimum of 10% ESH (stand age less than 10 years, openings 5 acres in size and greater) | 8.3% |
| 8E1-OBJ2 Maintain a minimum of 10% in late-successional to old growth forest conditions > 100 years of age. | 57.7% |
| 8E1-OBJ4 Open Road density- <= 1.5 miles per square mile | 1.18 miles / sq. mile |

Table 5. Consistency with Purpose and Need

| Purpose and Need | Proposed Action |
|--|-------------------|
| Create and enhance wildlife habitat, in particular ruffed grouse and woodcock habitat. | Increases |
| Maintain a mix of tree species, balanced age class distribution and function. | Meets / Increases |
| Harvest wood products and contribute to markets by implementing the goals and objectives of the forest plan. | 16,800 CCF |

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Glossary

Forest an ecosystem characterized by a more or less dense and extensive tree cover, often consisting of stands varying in characteristics such as species composition, structure, age class, and associated processes, and commonly including meadows, streams, fish, and wildlife.

Rotation in even-aged systems, the period between regeneration establishment and final cutting.

Shade Tolerance is the ability of a plant to germinate, establish, survive, compete for resources, and grow under canopies of varying densities. Tables have been developed to indicate a species tolerance to shade. For example, flowering Dogwood, Red Maple, and Black Gum are considered shade tolerant species and can grow and thrive in a shaded understory. Oak species, on the other hand, are less tolerant to shade and require moderate to high sunlight levels to grow and thrive.

Site preparation (Site Prep) is hand or mechanized manipulation of a site, designed to enhance the success of regeneration. Treatments may include burning, spraying, raking and scarifying and are designed to modify the soil, litter, or vegetation and to create microclimate conditions conducive to the establishment and growth of desired species.

Stand is a contiguous group of trees sufficiently uniform in age-class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit.

Woodland is a forested area in which, in contrast to a typical forest, the trees are often small, characteristically short-boled relative to their crown depth, and forming only an open canopy with the intervening area being occupied by lower vegetation, commonly grass.

Appendix A

Stands proposed for commercial harvest

| Compartment | Stand | Mngt Rx | Treatment | Acres | Site Index | Age (in 2021) | Forest Type |
|-------------|-------|---------|---------------------------|-------|------------|------------------|-------------|
| 4970 | 2 | 7.E.2 | Thin | 7 | 88 | 81 | 56 |
| 4970 | 3 | 7.E.2 | Thin | 31 | 78 | 96 | 10 |
| 4970 | 5 | 7.E.2 | Thin | 30 | 90 | 91 | 56 |
| 4970 | 6 | 7.E.2 | Thin | 7 | 70 | 91 | 53 |
| 4970 | 7 | 7.E.2 | Thin | 12 | 100 | 91 | 42 |
| 4970 | 10 | 7.E.2 | Thin | 15 | 75 | 81 | 42 |
| 4970 | 11 | 7.E.2 | Thin | 11 | 80 | 96 | 10 |
| 4970 | 12 | 7.E.2 | Thin | 11 | 70 | 81 | 42 |
| 4970 | 22 | 7.E.2 | Thin | 25 | 85 | 76 | 3 |
| 4970 | 35 | 7.E.2 | Thin | 16 | 65 | 111 | 15 |
| 4970 | 39 | 7.E.2 | Thin | 24 | 80 | 91 | 10 |
| 4970 | 55 | 7.E.2 | Thin | 16 | 90 | 101 | 10 |
| 4970 | 66 | 7.E.2 | Shelterwood - reserves | 19 | 100 | 101 | 50 |
| 4970 | 71 | 7.E.2 | Thin | 20 | 54 | 91 | 10 |
| 4970 | 87 | 7.G | CC - white pine | 12 | 101 | 37 | 3 |
| 4971 | 1 | 8.E.1 | CC | 22 | 85 | 93 | 60 |
| 4971 | 2 | 8.E.1 | Thin | 11 | 66 | 76 | 60 |
| 4971 | 5 | 8.E.1 | CC - reserves | 31 | 63 | 105 | 60 |
| 4971 | 7 | 8.E.1 | CC - reserves | 11 | 60 | 105 | 53 |
| 4971 | 8 | 8.E.1 | CC - reserves | 23 | 80 | 81 | 42 |
| 4971 | 14 | 8.E.1 | CC - reserves | 23 | 80 | 90 | 59 |
| 4971 | 17 | 8.E.1 | Thin | 73 | 60 | 91 | 60 |

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| Compartment | Stand | Mngt Rx | Treatment | Acres | Site Index | Age (in 2021) | Forest Type |
|-------------|-------|------------|-----------------------|--------|------------|------------------|-------------|
| 4972 | 1 | 7.E.2 | Thin | 45 | 60 | 93 | 42 |
| 4972 | 4 | 7.E.2 | Thin | 14 | 60 | 98 | 42 |
| 4972 | 36 | 7.E.2 | Thin | 34 | 67 | 93 | 10 |
| 4972 | 41 | 7.E.2 | Thin | 18 | 58 | 93 | 42 |
| 4973 | 7 | 7.E.2 | Thin | 57 | 71 | 90 | 42 |
| 4973 | 15 | 7.E.2 | Thin | 116 | 81 | 90 | 10 |
| 4973 | 25 | 7.E.2 | Thin | 38 | 84 | 90 | 10 |
| 4974 | 5 | 7.E.2 | Thin | 17 | 50 | 117 | 42 |
| 4974 | 22 | 7.E.2 | Thin | 9 | 65 | 95 | 42 |
| 4974 | 29 | 7.E.2 | Thin | 28 | 80 | 84 | 10 |
| 4976 | 13 | 7.E.2 | Thin | 25 | 81 | 95 | 10 |
| 4976 | 21 | 7.E.2 | Thin | 48 | 78 | 96 | 42 |
| 4977 | 1 | 7.E.2, 9.H | Thin | 36, 3 | 90 | 107 | 10 |
| 4977 | 9 | 7.E.2 | Thin | 61 | 111 | 107 | 45 |
| 4977 | 14 | 7.E.2, 9.H | Thin | 10, 12 | 97 | 107 | 10 |
| 4977 | 16 | 7.E.2 | Thin | 57 | 66 | 102 | 60 |
| 4977 | 21 | 9.H | Thin | 0 | 60 | 102 | 42 |
| 4977 | 22 | 9.H | Coppice - reserves | 24 | 60 | 111 | 60 |
| 4977 | 23 | 7.E.2 | Thin | 46 | 79 | 90 | 42 |
| 4977 | 29 | 7.E.2 | Thin | 27 | 70 | 105 | 8 |
| 4977 | 31 | 7.E.2 | Thin | 11 | 75 | 107 | 42 |
| 4978 | 2 | 8.E.1 | CC - reserves | 39 | 70 | 107 | 52 |
| 4978 | 10 | 8.E.1 | CC - reserves | 10 | 60 | 107 | 60 |
| 4978 | 13 | 8.E.1 | Thin | 84 | 65 | 107 | 60 |
| 4978 | 17 | 8.E.1 | Thin | 89 | 65 | 107 | 42 |

| Compartment | Stand | Mngt Rx | Treatment | Acres | Site Index | Age (in 2021) | Forest Type |
|-------------|-------|---------|---------------------------|-------|------------|------------------|-------------|
| 4978 | 19 | 8.E.1 | CC - reserves | 8 | 80 | 88 | 10 |
| 4979 | 4 | 8.E.1 | CC - reserves | 65 | 85 | 86 | 10 |
| 4979 | 8 | 8.E.1 | CC - reserves | 54 | 72 | 96 | 42 |
| 4979 | 22 | 8.E.1 | CC - reserves | 36 | 62 | 113 | 60 |
| 4983 | 1 | 7.E.2 | Shelterwood - reserves | 16 | 100 | 91 | 3 |
| 4983 | 2 | 7.E.2 | Shelterwood - reserves | 13 | 75 | 86 | 3 |
| 4983 | 5 | 7.B | Thin | 43 | 76 | 86 | 52 |
| 4984 | 3 | 7.E.2 | Thin | 32 | 60 | 96 | 60 |
| 4984 | 11 | 7.E.2 | Thin | 68 | 60 | 86 | 60 |
| 4984 | 15 | 7.E.2 | Thin | 23 | 87 | 96 | 10 |
| 4984 | 16 | 7.E.2 | Thin | 11 | 100 | 86 | 54 |
| 4984 | 17 | 7.E.2 | Thin | 4 | 70 | 91 | 52 |